

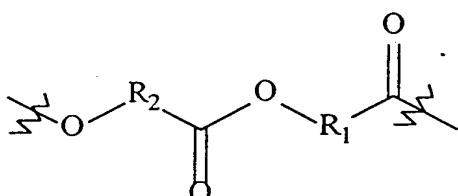
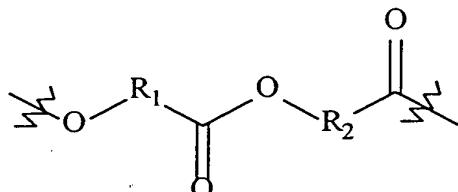
What is claimed:

1. A composition comprising a pre-formed, hydrolytically susceptible polyanionic polymer comprising:
 - at least one linking moiety comprising a hydrolytically susceptible bond; and
 - linked to the linking moiety at least two polyanionic polymer segments, wherein all polyanionic polymer segments in the polymer are linked to the whole by a said linking moiety, and 90% or more of the polyanionic polymer segments in the composition have molecular weight of 50 kd or less.
- 10 2. The composition of claim 1, wherein 90% or more of the polyanionic polymer segments in the composition have molecular weight of 40 kd or less.
- 15 3. The composition of claim 1, wherein the average molecular weight of the polyanionic acids segments in the composition is from 20 kd to 40 kd.
- 20 4. A method of making the composition of claim 1, comprising:
 - reacting by free radical-mediated polymerization (a) monomers adapted to create polyanionic polymer segments in the presence of crosslinking reagent adapted to create, following free-radical-mediated incorporation into polymer, the linking moieties; and
 - contacting the reacting monomers with a chain-elongation terminator in an amount adapted to limit the molecular weight of the polyanionic polymer segments.
- 25 5. A composition comprising a pre-formed, hydrolytically susceptible polyanionic polymer comprising:
 - polyanionic polymer segments, wherein 90% or more of the polyanionic polymer segments in the composition have molecular weight of 50 kd or less; and
 - linking the polyanionic segments at least one linking moiety comprising

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(a) a core which is a C₁ to C₁₂ alkylene with three or more linking oxy or thio groups or a mono or disaccharide with three or more terminal oxy groups;

(b) linked to each linking oxy or thio, -R³n-, where n is zero or greater with the total sum of the n values being at least three, and the R³ radicals are independently:



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wherein the carbonyl radical is linked to the linking oxy or thio, and wherein R¹ and R² are independently methylene or ethylene which can be substituted with up to two C₁ to C₄ alkyls; and

15 (c) the residue after incorporation into the polyanionic polymer segments of unsaturated moieties that are ester or ether linked to by oxy of R³.

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6. The composition of claim 5, wherein the average molecular weight of the polyanionic acids segments in the composition is from 20 kd to 40 kd.

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7. A method of making the composition of claim 5 comprising:
reacting by free radical-mediated polymerization (a) monomers adapted to create polyanionic polymer segments in the presence of crosslinking reagent adapted to create, following free-radical-mediated incorporation into polymer, the linking moieties; and

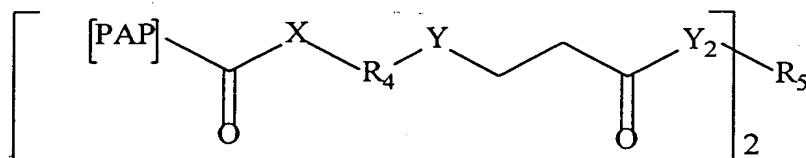
contacting the reacting monomers with a chain-elongation terminator in an amount adapted to limit the molecular weight of the polyanionic polymer segments.

5 8. A polyanionic polymer comprising:
two or more linearly linked polyanionic polymer segments linked via terminating
oxo or thio moieties derived from a hydroxide or thiol moieties; and
linker moieties cleavable at internal amide, ester or thioester bonds linking the
linkers to form the linear polyanionic polymer segments.

10 9. The polyanionic polymer of claim 8, wherein the polyanionic polymer
comprises a monomer moiety which consists of atoms selected from carbon, hydrogen,
oxygen and sulfur and comprises carbon and hydrogen.

15 10. The polyanionic polymer of claim 8 wherein the linearly linked
polyanionic segments are crosslinked hydrolytically susceptible linking moieties.

11. A polyanionic polymer comprising:
polyanionic polymer segments (PAP) containing carboxylates; and
20 linkers crosslinking the polyanionic polymer segments having the structure:



, wherein the illustrated carbonyls adjacent to PAP are derived from the
carboxylates, and wherein X, Y and Y² are independently S, O or NH and R⁴ is a
straight chain C₁-C₁₀ alkyl which can be substituted with up to two C₁-C₄ alkyls and R⁵ is
25 an hydrolytically susceptible linking moiety comprising C, H and two or more
heteroatoms which can be O, S or N, the O, S and N atoms all participating in
hydrolytically susceptible bonds or ether or thioether bonds.

30 12. A polyanionic polymer comprising hydrolytically susceptible bonds, the
polyanionic polymer comprising:

- two or more polyanionic polymer segments;
- linking moieties coupling the polyanionic polymer segments, wherein the linking moieties comprise (I) or (II) below or both:

5 (I) a segment joined via amide, ester or thioester bonds incorporating an acyl or acyl analog moiety of the polyanionic polymer, wherein the segment comprises:

- 10 (a) a C₁ to C₁₂ alkylene with terminal linkers selected from oxy, thio (-S-) or imino (-NR-, where R is H or C₁-C₆ alkyl) incorporated into the amide, ester or thioester bonds, provided that at least one of the amide, ester or thioester bonds is other than an ester bond; or
- 15 (b) an amide, ester or thioester linked polymeric segment of (i) hydroxy or thiol C₂-C₅ carboxylic acid or hydroxy proline derivatives and (ii) {(a) a C₁ to C₁₂ alkylene moiety with terminal linkers selected from oxy, thio (-S-) or imino (-NR-, where R is H or C₁-C₆ alkyl) incorporated into the amide, ester or thioester bonds or (b) an α,ω -diol or a chain extended α,ω -diol}; or
- 20 (c) an amide, ester or thioester linked polymeric segment of (i) one or more hydroxy or thiol C₂-C₅ carboxylic acid or hydroxy proline derivatives, (ii) {(a) a C₁ to C₁₂ alkylene moiety with terminal linkers selected from oxy, thio (-S-) or imino (-NR-, where R is H or C₁-C₆ alkyl) incorporated into the amide, ester or thioester bonds or (b) one or more α,ω -diols or chain extended α,ω -diols} and (iii) one or more carbonyldioxy moieties; or
- 25 (d) an amide, ester or thioester linked polymeric segment of (ii)(a) a C₁ to C₁₂ alkylene moiety with terminal linkers selected from oxy, thio (-S-) or imino (-NR-, where R is H or C₁-C₆ alkyl) incorporated into the amide, ester or thioester bonds, (ii)(b) one or more chain extended α,ω -diols and (iii) one or more carbonyldioxy moieties; or
- 30 (e) an amide, ester or thioester linked polymeric segment of (ii)(b) one or more chain extended α,ω -diols and (iii) one or more carbonyldioxy moieties; or

- (f) a direct anhydride formed between acid moieties of the polyanionic polymer; or
- (g) an anhydride bridge formed between acid moieties of the polyanionic polymer with carbonyl bridge; or
- 5 (I) the residue after a crosslinking reaction of:
- (a) two or more terminal acrylate or methacrylate moieties providing unsaturated bonds available for the crosslinking reaction;
- (b) a segment joining the terminal acrylate or methacrylate moieties via amide, ester or thioester bonds incorporating an acyl bond of the acrylate or
- 10 methacrylate moieties, wherein the segment comprises:
- (1) a C₁ to C₁₂ alkylene with terminal linkers selected from oxy, thio (-S-) or imino (-NR-, where R is H or C₁-C₆ alkyl) incorporated into the amide, ester or thioester bonds, provided that at least one of the amide, ester or thioester bonds is other than an ester bond; or
- 15 (2) an amide, ester or thioester linked polymeric segment of (i) hydroxy or thiol C₂-C₅ carboxylic acid or hydroxy proline derivatives and (ii) {(a) a C₁ to C₁₂ alkylene moiety with terminal linkers selected from oxy, thio (-S-) or imino (-NR-, where R is H or C₁-C₆ alkyl) incorporated into the amide, ester or thioester bonds or (b) an α,ω-diol or a chain extended α,ω-diol}; or
- 20 (3) an amide, ester or thioester linked polymeric segment of (i) one or more hydroxy or thiol C₂-C₅ carboxylic acid or hydroxy proline derivatives, (ii) {(a) a C₁ to C₁₂ alkylene moiety with terminal linkers selected from oxy, thio (-S-) or imino (-NR-, where R is H or C₁-C₆ alkyl) incorporated into the amide, ester or thioester bonds or (b) one or more α,ω-diols or chain extended α,ω-diols} and (iii) one or more carbonyldioxy moieties; or
- 25 (4) an amide, ester or thioester linked polymeric segment of (ii)(a) a C₁ to C₁₂ alkylene moiety with terminal linkers selected from oxy, thio (-S-) or imino (-NR-, where R is H or C₁-C₆ alkyl) incorporated into the amide, ester or thioester bonds, (ii)(b) one or more chain extended α,ω-diols and (iii) one or more carbonyldioxy moieties; or
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(5) an amide, ester or thioester linked polymeric segment of (ii)(b) one or more chain extended α,ω -diols and (iii) one or more carbonyldioxy moieties.

the first time in the history of the world.